"Transactions Quarterly is a forward step in Technical Communications" . . .

T. E. Leontis, Chairman
ASM Transactions Committee
(See page 5)

March, 1961

MR

METALS REVIEW

The News Digest Magazine

It's New . . .
TRANSACTIONS QUARTERLY

Now, Industry's Best Scientific Papers Reach You Faster—Four Times A Year

MARCH • JUNE • SEPTEMBER • DECEMBER

As an ASM member, you are well-acquainted with the annual bound volume of ASM Transactions. Over the years, Transactions has become one of the most renowned and respected publications ever to carry the highly-technical and scientific information needed by technical managers throughout the world. Now, this *same volume* becomes more useful and valuable as a *quarterly magazine.*

The Transactions Quarterly will come to you in the same 6 x 9 inch size as the annual volume. But the greatest advantage lies in the speed with which you will receive papers written by the industry's foremost authorities. Papers will be published soon after acceptance by the ASM Transactions Committee. *No delay.* The most current information reaches you faster than ever before!

In addition, a new feature called Technical Notes will cover new methods and techniques, special designs of equipment, other pertinent information of a specific, high interest nature.

IN THE MARCH TRANSACTIONS QUARTERLY

- **A Quantitative Metallographic Analysis of Graphite Sphere Size in Ductile Cast Iron. Brophy, MIT. Sinnott, U. of Michigan.**
- **Influence of Delta-Ferrite-Carbide Segregates on the Mechanical Properties of Modified 12% Chromium Steel. Loria, Climax Molybdenum Co.**
- **Shear Deformation of Magnesium and Zinc Crystals. Phillips, E. I. Du Pont.**
- **Effect of Stress Decreases on the Creep of Aluminum in the Dislocation Climb Region. Raymond Ludemann, Dorn, U. of California.**
- **Investigation of the Intermediate Temperature Ductility Minimum in Metals. Rhines, Wray, U. of Florida.**
- **The Effect of Oxygen on the Properties of Zircaloy-2, Rubenstein, Shubert, Goodwin, Westinghouse Bettis.**
- **The Effect of Prestraining and Retempering on AISI 4340. Stephenson, MIT. Cohen, Bethlehem Steel Co.**
- **Effects of Surface Condition on the Mechanical Properties of Beryllium Sheet. Matthews, Jacobson, Lockheed Aircraft Corp. Ward, International Nickel Co.**
- **Direct Reduction of Ferric Oxide by Solid Carbon in Vacuum. Yun, Argonne National Laboratory.**
- **Constitution Studies of the Indium-Rich Portion of the System Antimony-Bismuth-Indium. Peretti, U. of Notre Dame.**
- **Constitution and Transformation Behavior of the Ti-8A1-8Zr-1 (Ta-Cb) Alloy. Margolin, New York University. Ence, Republic Aviation Corp.**
- **Phase Equilibria in the Yttrium-Aluminum System. Lundin, Klodt, U. of Denver.**

THE DECEMBER ISSUE

As the *annual* ASM Transactions has done in the past, the December issue of the Transactions Quarterly will carry the ASM Annual Report; Discussions of papers presented at the National Metal Congress; Technical Notes; the Campbell Memorial Lecture. Transactions will continue to be available in annual bound volumes.

ORDER TODAY!

ONLY $3.00
PER YEAR TO ASM MEMBERS

NON-MEMBERS $10.00
OVERSEAS.....ADD $2 TO ABOVE PRICES

American Society for Metals
Metals Park, Dept. MR-3
Novelty, Ohio

Please enter my subscription to the **Transactions Quarterly**, at $3.00 per year. ($10.00 for non-members)

☐ Please invoice my firm Check here ☐ if ASM member.
☐ Enclosed is $..... Please add $2.00 for postage if overseas.

NAME.....

COMPANY.....

STREET..... CITY..... STATE.....

March, 1961 Vol. XXXIV, No. 3

METALS REVIEW

The News Digest Magazine

Contents

Transactions Goes Quarterly to Speed Communications 5
Metals Handbook Intensifies Coverage 7
ASM Managerial Appointments Designed for Improved Services 8
ASM-MEI Diploma Program Authorized 11
Steel Founders Celebrate 100 Years of Progress 12
Southern Metals Conference Set for Apr. 24-26 13

Important Lectures

Advances in Welding, by R. D. Thomas, Jr. 6
Oak Ridge Metal Forming Facilities, by J. L. Williams 11
Metallographic Techniques Reveal Reasons for Plastic Deformation, by W. G. Johnston 12
Making Stainless Useful, by F. K. Bloom 14
Vacuum Metallurgy Techniques, by George Fegan 14
Furnace Atmospheres, by C. A. Mueller 15
Precious Metal Plating Affected by Base Metal, by E. A. Parker 19
Mechanisms of Brittle Fracture, by R. W. Guard 20
Foamed Metals, by L. F. Yntema 20

Departments

Editor's Page 4
Chapter Briefs 11
Important Meetings 15
Men in Metals 16
3-Minute Glass 26
Obituaries 17
R & D News 18
Chapter Calendar 21
Employment Service Bureau 22

Published monthly at 404 N. Wesley Ave., Mount Morris, Ill., by the American Society for Metals. Editorial and general offices Metals Park, Novelty Ohio: W. A. Pennington, President; C. E. Swartz, Vice-president; R. J. Raudebaugh, Treasurer; Merrill A. Scheil, Secretary; C. H. Samans, A. R. Fairchild, Morris Cohen and John Convey, Trustees; Walter Crafts, Past President. Subscriptions, $3.00 per year ($7.50 foreign). Single copies $1.50. Second class postage paid at Mount Morris, Ill. and at additional mailing offices.

Claims for missing numbers will not be allowed if received more than 60 days from date of issue. No claims allowed from subscribers from overseas, or because of failure to notify the circulation department of a change of address or because copy is "missing from files".

THE EDITOR'S PAGE

We find in traveling about the country many people do not realize the growth that is taking place within ASM. Here, for their benefit, are some recent figures: ASM membership as of Feb. 1, 1961, 33,621. Most of these are affiliated with the 115 ASM chapters in the United States and Canada. There are also approximately 15 student groups affiliated with chartered chapters. Efforts are now being made by more than 70 of the chapters to extend membership in ASM to plants where there is no representation at present. The purpose, of course, is to spur an even greater exchange of ideas among members than has occurred in the past. The result of contacting the many men who are not aware of what they can receive through ASM participation is expected to be a membership in excess of 35,000 by midyear.

Early Review

By now most regular members will have received their individual copies of Vol. 1, 8th Edition, Metals Handbook, "Properties and Selection of Metals". Already those who were among the first to get their copies have reported enthusiasm for the monumental work. On personal observation it can be reported that these early copies are already well thumbed and had to be well guarded. Your comments will be appreciated.

Helpful Friendship

Above reference was made to benefits of active ASM membership. Participation includes regular attendance at meetings where association and contact with like-minded people equals in value the knowlelge gained from guest speakers.

A recent example comes to mind. In speaking before a chapter a short time ago, reference was made to new methods of putting refractory coatings on metals to prepare them for special services. Following the formal talk, one member of the audience approached the speaker to seek details of these methods. Another member of the audience overheard the question and volunteered to help the information seeker. His offer included the coating of samples that his new-made acquaintance might like to supply.

This type of cooperation cannot be purchased. However, it is given freely and regularly at nearly any ASM meeting anywhere in the country. You cannot fail to be helped whether you are on the giving or receiving end of such an exchange.

How True

Recently, several past presidents of ASM were asked to participate in a seminar to consider the future of ASM. Among the participants was J. B. Austin of U. S. Steel Corp. Dr. Austin had many cogent ideas to present, but this one quote of his merits thought and repetition.

"A conservative is an older person who stubbornly clings to the radical views of his youth."

About a Name

Perhaps it is time to put to rest forever the mistaken notion that there is some connection between ASM's postal address and its unusual headquarters' building. I refer, naturally, to the name Novelty. There has been a post office by the name of Novelty, Ohio, for many, many years. ASM's new building falls within the area of this established post office, hence, our present address.

If we had our druthers, we'd druther have the post office named Metals Park, Ohio. It is entirely possible that this change might come about. We certainly hope so and for reasons that have more soundness than a desire to forestall the eternal question "Why did you pick the name Novelty?"

For what it is worth—will not vouch for it—there are some who claim that Novelty was applied to this point which was at one time the end of an interurban electric line. People are said to have taken Sunday rides to Novelty, for the novelty of it.

T. C. DuMond

Transactions Goes Quarterly To Speed Communications

Here is real news for all ASM members! They will now get Transactions papers every three months in a new journal, Transactions *Quarterly*. This speed-up, recently decided upon by the ASM Transactions Committee, is expected to meet favor everywhere. The annual volume will still be available.

R. W. Guard, immediate past chairman, predicts that the Quarterly will be an important factor in attracting the best authors, presenting high quality papers, because of its fast publishing schedule.

Under the prior system, for example, a paper accepted in September 1960 would be printed in the Spring of 1961 and presented at the October 1961 Congress. It would be published in a bound Transactions volume in May of 1962—a lag of 20 months. Under these conditions the paper could easily represent work conceived and performed 2 to 2½ years prior to publication. With the quarterly publication system, maximum delay is six months (papers accepted in September will be in the following March issue).

The Transactions Quarterly will average about 250 pages per issue for the March, June and December issues. The September issue will be larger—around 500 pages. All papers accepted through the first eight months of any volume year will be published in that year's quarterly.

The December issue will carry the Campbell Memorial Lecture and the annual index, plus the Annual Report of the Society and discussion of papers published that year. Under the prior system, the Lecture and Annual Report were not available to the members until the following May at the earliest. An important new feature under consideration for *Transactions Quarterly* is called "Technical Notes," which will consist of brief mention of new techniques or concise theoretical treatment of a current metallurgical problem.

An annual volume containing the year's Transactions Quarterlies will be offered with a hard-cover binding; individual issues of Transactions Quarterlies will be paper-backed. Subscription price of the Quarterly will be $3 per year to ASM members ($10 to non-members). Non-member price of the hard-cover annual volume is $15. This is reduced to $6 for ASM members. Overseas prices: add $2 for the Quarterly or add $1 for the annual volume.

The content of the *Transactions Quarterly* will be essentially that which has been provided in Transactions over the past 41 years. Page size and format will remain quite similar to the arrangement in previous volumes. Presentation of Transactions papers in a quarterly journal constitutes permanent publication and is recognized as such by libraries and abstracting services.

The concept of a *Transactions Quarterly* is not new. From 1935 to 1943, the Society handled papers in this manner. Before 1931 it was on a monthly basis.

"The *Transactions Quarterly* is an integral part of an over-all plan to increase service to ASM members by providing faster dissemination of information not readily available at present", states Allan Ray Putnam, ASM's Managing Director. "The launching of the companion journal *'Metals Engineering Quarterly'* in February 1961 has provided a vehicle for the promulgation of engineering papers presented at Metal Congresses and ASM regional meetings. In adidtion, a long-range study is underway to determine the feasibility of a publication covering Critical Reviews and Correlated Abstracts, designed to up-date technical men in a specific field with a minimum amount of reading".

Leontis Calls Transactions Quarterly . . . "A Most Important Step in Technical Communcations"

Another major progressive step has been taken by your ASM. Beginning in March and every three months thereafter, all papers accepted by the Transactions Committee will be published in what will be known as the *Transactions Quarterly*.

This decision was reached by the Transactions Committee at its meeting in December 1960. (It was ap-

proved by the Board of Trustees on Dec. 21, 1960.) A great deal of thought and planning preceded this move. Actually it had been under active consideration and discussion for over a year.

It was further recognized that ASM was taking an inordinately long time to publish technical papers. We believe that this situation has been a serious deterrent to our attracting high-caliber papers. Many factors entered into this decision; however, the overriding factor was the speed with which we could publish information. With *Transactions Quarterly,* papers can be published in as short a time as three months after the date of acceptance by the Transactions Committee and never later than six months. We are confident that this arrangement will be most attractive to future ASM authors. In addition, consideration is being given to a "Technical Notes" section in *Transactions Quarterly* which for the first time would give ASM a suitable publishing medium for this type of article, which is defined as "technical information of a specific nature too limited in scope to be classified as a paper".

I urge each and every ASM member who is directly involved in technical work to subscribe to *Transactions Quarterly,* I am confident you will find it to be one of the most valuable journals coming across your desk.

T. E. Leontis, Chairman
ASM Transactions Committee

Advances in Welding

The advent of the nuclear and missile age has brought about spectacular progress in the development of welding techniques, a joint meeting of the **Minnesota** Chapters ASM and AWS was told by R. D. Thomas, Jr., national president AWS. Mr. Thomas, who is also president of Arcos Corp., stated that this progress was especially remarkable in the welding of stainless and low-alloy steels.

The austenitic steels as a group have good weldability. These steels are widely used in welded vessels where contamination of the products as well as the corrosion of the vessel must be considered. Susceptibility to intergranular attack in the weld and in the heat affected zone has long been controlled by heat treatment and the use of stabilizers such as columbium and titanium. The use of oxygen steelmaking practice to produce very low carbon stainless steels, such as type 304L, often makes the older measures unnecessary.

The need for smooth internal surfaces in nuclear piping led to the development of the consumable insert technique. A consumable insert ring placed internally is fused using the tungsten inert gas method to provide a root pass with a smooth internal contour. The use of this technique usually requires an inert atmosphere inside the pipe.

The application of welding processes to low-alloy steels has been hastened by the many missile applications. At present, high yield strength steels are usually welded by the inert gas processes although with some difficulty. The use of automatic welding processes is desirable from the economic standpoint, but is still not possible with most of the very high yield materials. Rapid progress is being made and prospects are good that the submerged arc process will soon be widely used on these steels.

Mr. Thomas pointed out that hydrogen flaking and cracking in the weld and the heat affected zone are still a problem in welding alloy steels. The problem can be alleviated by baking and hermetic packaging of the electrodes; but because many welding operations, such as in shipbuilding, must be located in humid areas, the difficulty recurs from time to time. It is important that this and other problems in welding be brought under absolute control as quickly as possible since the economy of this country depends heavily on our performance and efficiency in fabrication techniques. (*Reported by Jack Sartell.*)

Technical Papers Invited for ASM TRANSACTIONS

The ASM Transactions Committee is now receiving technical papers for consideration for publication in the Society's Transactions. Papers to be considered for publication during 1961 must be received at Metals Park by Apr. 15, 1961.

Many of the papers accepted by the committee will be scheduled for presentation at the 43rd National Metal Congress and Exposition, Cobo Hall, Detroit, Michigan., Oct. 23-27, 1961.

Although papers are considered and acted upon at four quarterly meetings of the Transactions Committee, only those received prior to the Apr. 15 deadline are eligible for publication and presentation this calendar year.

Final consideration of papers for publication and the selection of approved papers for presentation at the 1961 Metal Congress will be made in May 1961.

Manuscripts can be submitted at any time during the year and upon acceptance by the Transactions Committee will be processed immediately for publication in Transactions Quarterly. Printing of a paper does not necessarily infer that it will be presented at the Society's Convention. Transactions Quarterly is available to ASM members at an annual subscription rate of $3.00 (non-member subscription rate $10.00 per year).

Manuscripts in triplicate, plus one set of unmounted original photographs and original tracings should be sent to the attention of T. C. DuMond, Secretary, Transactions Committee, American Society for Metals, Metals Park, Novelty, Ohio.

Prospective authors should send for a copy of the booklet "Suggestions to Authors in the Preparation of Technical Papers". The booklet is particularly helpful in the preparation of line drawings.

NEW HANDBOOK INTENSIFIES COVERAGE

Coverage of the all-important subjects of selection and properties of metals has been greatly expanded and intensified in the new Metals Handbook volume. Unlike its predecessors, it is the first of a projected series of volumes, each of which, when completed, will serve as a comprehensive tributary to the mainstream of our present knowledge of metals and metalworking.

Volume 1 of the new 8th edition —the book that is now being distributed to more than 30,000 ASM members — contains 1300 pages, 6707 illustrations, 1841 tables, over 100 major articles, 2806 definitions, and a complete 64-page index for ready reference. More than 1300 persons contributed to the new volume.

It is a big book, of course. But more important from the user's standpoint, it contains two and a half times as many pages on selection and properties of metals as was contained in the 1948 edition. Again, compared to the previous edition, the new volume contains nearly six times as much numerical information in the form of charts, graphs and tables (see tabulation below). This increased emphasis on easily accessible data (as distinguished from descriptive text) and the closer relation of the new Handbook to engineering practice (as evidenced by the large number of specific examples and comparisons) constitute the major differerences between the 7th and 8th editions.

Certain innovations establish the current volume as a genuinely *new* book. For example, 12 articles on products and 14 on selection make up the comprehensive section on carbon and low-alloy steels. Articles on hot finished carbon steel, hardenable carbon steel and low-carbon steel sheet deal with widely used materials that were covered only briefly in previous editions.

Similarly, all of the articles dealing with metal selection for specific engineering properties are entirely new. The section on stainless steels now provides ample coverage of all stainless steels, including the more recently developed precipitation-hardening alloys. Extensive data are given on iron-base superstrength alloys, nickel-base and cobalt-base and titanium alloys.

More pages than ever before are assigned to magnetic, electrical and other special-purpose metals, cast irons, and—a subject of rapidly expanding interest—the properties of pure metals.

This is truly a "working" handbook. It is based on the first-hand experience and knowledge of 1335 ASM member-contributors from every major area of the metalworking industry. It represents many men's jobs, functions and objectives.

The people behind the Metals Handbook constitute its most important element. Culmination of years of preparation by the ASM Handbook Committee, under the chairmanship of N.E. Promisel, and 83 different author committees, the Handbook exemplifies the basic Society aim of exchange of ideas and information.

Mailing of the new Handbook to ASM members is being accomplished at the rate of about 10,000 per week. All U.S. and Canadian members of record as of Dec. 31, 1960, should have received their copies by the end of March.

The tabulation below compares in detail the new volume with the corresponding subject matter on properties and selection in the previous edition.

Comparison of Volume 1 of the 8th Edition with Corresponding Subject Matter on Properties and Selection in the 7th Edition

Class of material	Illustrations		Tables		Contributors		Pages	
	8th ed.	7th ed.	8th ed.	7th ed.	8th ed.	7th ed.	8th ed.	7th ed.
Carbon and low-alloy steels	1917	195	351	101	287	45	286	91
Cast irons	306	31	98	15	59	3	58	17
Stainless steels and heat-resisting alloys	1651	40	255	80	218	25	230	33
Tool materials	815	22	181	28	248	29	142	23
Magnetic, electrical and other special-purpose materials	249	86	120	55	115	11	86	39
Nonferrous metals	1680	261	798	513	264	118	367	238
Definitions and reference tables	89	1	38	28	144	40	67	40
Totals	6707	636	1841	820	1335	271	1236	481

ASM MANAGERIAL APPOINTMENTS

DESIGNED FOR IMPROVED SERVICES

William J. Hilty Appointed ASM Exposition Manager Upon C. L. Wells Retirement

William J. Hilty has been appointed ASM exposition manager in the communications department with the retirement of Chester L.

Wells, following the 12th Western Metal Exposition. Hilty will manage the 1961 Detroit Metal Show, to be held this October 23-27, and all future national and regional ASM expositions.

ASM is a pioneer in the field of educational exhibits, and one of the few groups that operate their own expositions with their own staffs. The Society considers these to be invaluable in their educational contributions to metalworking technology, and an important part of ASM's long-range educational programs. As one of the Society's services, members are admitted to all exhibits without charge.

Advertising manager of *Metal Progress* and *Metals Review* since September 1959, Hilty joined the ASM communications staff in 1955 as Cleveland district manager. He was Cleveland-Pittsburgh regional manager for one year prior to becoming advertising manager. Before coming to ASM, he was an associate account executive for Fuller & Smith & Ross, Cleveland, where one of his accounts was ASM.

A graduate of Fenn College, he flew in World War II as a bombardier-navigator in the European Theater. Now on ready status with the Air Force Reserve, he is a public relations officer in the 9025th Air Reserve Squadron, Cleveland. He is on the board of governors of Cleveland Chapter, Association of Industrial Advertisers, and a member of the t.f. club of Cleveland. He lives with his wife, Davelyn, and four children at 40 Lyndale Dr., Chagrin Falls, Ohio.

Chester L. Wells was appointed exposition manager in 1958 after the death of William H. Eisenman, ASM founder-member and national secretary for more than 40 years. Prior to that he had assisted Mr. Eisenman in managing the Metal Shows. Wells' first position with ASM was as eastern representative for *Metal Progress*. In addition to his Metal Show responsibilities, Wells has headed the membership records department and distribution of technical books for the Society. He is active in the National Association of Exhibit Managers and has served as its secretary-treasurer since 1946.

Bill Hilty's appointment comes as a step in a series of organizational moves designed to help the Society increase its effectiveness in meeting educational responsibilities to its members and the industry they represent. Last month A. P. Ford's appointment was announced as director of communications in charge of business management of expositions, publications, advertising and public relations. Similar realignment is taking place in three other ASM service activity areas.

To The Members of ASM:

Last month I announced the appointment of four new staff directors, Ted C. DuMond, A. P. Ford, Albert L. Lloyd and Ernest E. Thum, as the men who will largely direct the mainstreams of Society activity as it faces a challenging period of broadened scope and increased educational opportunity.

It is with pleasure that I tell you now of the managerial appointments of Allen G. Gray, William J. Hilty, Marjorie R. Hyslop, Taylor Lyman and Fred Stanley to positions of great importance to you, the members of the Society. These appointments constitute the next step in a concentrated effort to coordinate staff responsibilities along principles representing the latest thinking of modern management.

This series of moves is being made to help the Society best carry out its responsibilities and improve the scope of its services to members.

Cordially,
Allan Ray Putnam
Managing Director

Fred Stanley Made Metal Progress Advertising Manager

Fred Stanley, for five years ASM regional manager in Philadelphia, has been appointed advertising manager for *Metal Progress* and *Metals Review*, in the communications department, succeeding William J. Hilty, who has been named exposition manager. Stanley will supervise activities of an ASM field staff with offices in New York, Pittsburgh, Metals Park, Detroit, and Chicago, and with representatives in Los Angeles, San Francisco and overseas.

A native of New York City, he holds a degree in business administration from Holy Cross College. Before joining ASM, he was an advertising representative for *Journal of Metals* and for *Automation*. He is active in the New Jersey Chapter of American Society for Metals, as well as the New York, New Jersey, Philadelphia and Maryland Chapters of the Association of Industrial Advertisers.

At present living in East Brunswick, N. J., he will move to the Metals Park area with his wife, Joan, and four sons.

Marjorie R. Hyslop Named Manager of Documentation

After more than 30 years with the editorial staff of *Metal Progress*, Marjorie R. Hyslop will relinquish this association to take on a brand-new and eminently challenging job as manager of the ASM Documentation Service.

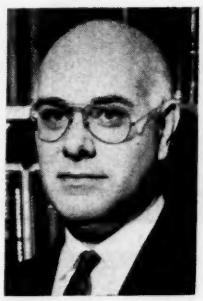
Since that time, she has also been managing editor and editor of *Metals Review*, and editor of the ASM *Review of Metal Literature* since its inception in 1944. She has been managing editor of *Metal Progress* since 1953. She did the editorial work on *Metals Review* singlehandedly for many years, and did it while serving in a dual capacity on the staff of *Metal Progress*.

About five years ago, she began her association with the pilot project sponsored by the ASM at Western Reserve University that was to culminate early in 1960 in the first operational electronic literature searching service to be offered to the public in a field as large as metallurgy. This, her "pet" project, has claimed an increasing portion of her time and effort during the past few years and now she assumes responsibility for managing this documentation service, an ASM educational special project that has seemingly unlimited potential.

Unquestionably one of the nation's most knowledgeable people on the subject of information retrieval, Mrs. Hyslop is largely responsible for the preparation by a joint committee of the American Society for Metals and the Special Libraries Association of the "ASM-SLA Metallurgical Literature Classification", a system that is seeing increasing use throughout the world. She holds membership and offices in a number of special committees and organizations in the field. She lives with her husband, John A. Hyslop, at Lake Lucerne, Chagrin Falls, Ohio.

Taylor Lyman Appointed Editor of ASM Reference Publications

With completion of the new eighth edition of Metals Handbook, volume I, "Properties and Selection of Metals", its editor becomes editor of all ASM reference publications. Taylor Lyman, in addition to future volumes of the Handbook, will now supervise editorial work on ASM technical books, government contracted manuals and monographs. This area, along with periodical publications of the Society, will be under the direction of Ernest E. Thum, director of editorial services.



Dr. Lyman received his A.B. degree in engineering from Stanford University, 1940, following with his master's degree in physical metallurgy from Harvard in 1941. He then earned his doctorate in metallurgy from Notre Dame in 1944. He was an instructor in metallurgy at Columbia University, Illinois Institute of Technology and Notre Dame, and gained practical experience as a metallurgist at the Bendix Aviation Corp. during the latter part of World War II.

He joined the staff of American Society for Metals in 1945 and edited the 7th edition of the Metals Handbook and its two supplements. He resides at 3705 Sutherland, Cleveland, with his wife, Irene, and two children.

Metal Progress' Allen G. Gray Becomes Editor for Periodicals

Allen G. Gray, who observed his third anniversary as editor of *Metal Progress* February 1, has been appointed editor of ASM periodical publications. Highly regarded by members and friends of ASM for his authoritative and enthusiastic approach to the editorial content of the Society's Number One periodical, Dr. Gray will now have general editorial supervision of all ASM periodical publications —*Metal Progress, Metals Review, Review of Metal Literature, Metals Engineering Quarterly* and *Transactions Quarterly*. He continues as editor of *Metal Progress*.

Dr. Gray is extremely attentive to the total needs of ASM's 34,000 members for materials and process engineering information. At this time, for example, he is thinking about the editorial lineup for the January 1962 issue of *Metal Progress!*

The relationship between editorial content and its educational potential to members is of great importance to him. He again will be working with Ernest E. Thum, who as director of editorial services will have over-all editorial responsibility for ASM publications, both periodical and reference.

The new editor of periodicals holds bachelor's and master's degrees in metallurgy from Vanderbilt University and earned his Ph.-D. from University of Wisconsin. He spent 12 years in research and development with the du-Pont Co. on metallurgical and chemical aspects of metalworking and metal processing. During World War II he was loaned from duPont to the University of Chicago, where he directed a group working on metallurgical problems for the Atomic Bomb Project. He also worked on special assignment with General Electric at the Knolls Atomic Power Laboratory on problems of the Savannah River Atomic Energy Plant. He had served *Steel* magazine on part-time basis as consulting editor, 1942-1952, and was technical editor of *Steel* from 1952-1957.

He is editor-in-chief of the Electrochemical Society monograph "Modern Electroplating", and has been lecturer for an advanced course at Western Reserve University dealing with metallurgy, electroplating and corrosion. A member of the Advisory Committee to the U.S. Atomic Energy Commission on Industrial Information, he holds a number of patents relating to metallurgical treatment of uranium for atomic energy applications. He is author of the section on steel technology in the Encyclopedia Americana. He lives at 23499 Shelburne Rd., Shaker Heights, Ohio, with his wife Jean, and two children.

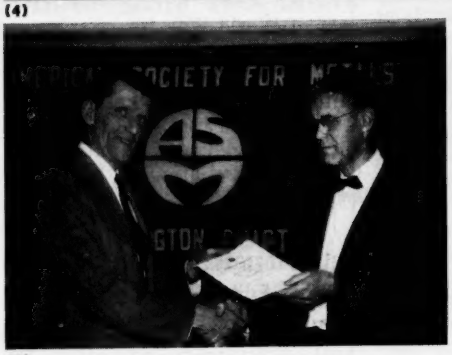
(1)

(2)

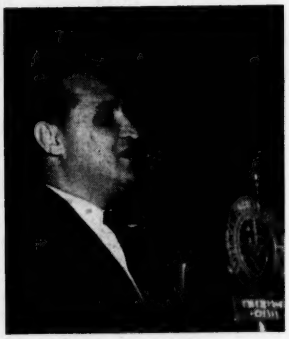
(3)

(*See captions, p.* 11)

(4)



(5)



(6)

(7)

Experts Describe Oak Ridge Metal Forming Facilities

"It is a real challenge to the metallurgist in the nuclear field to provide metal parts sufficiently stable to realize the full potential of today's precision machine tools", stated J. L. Williams, rolling and forming superintendent for Union Carbide Nuclear Co.'s Y-12 plant at Oak Ridge before the **Oak Ridge** Chapter.

Mr. Williams explained that the Y-12 plant was built in 1943 and 1944 as a part of the Manhattan Project's efforts to separate uranium isotopes. The Y-12 plant's present function in serving as the Atomic Energy Commission's largest and most versatile production and jobshop fabricator of precision parts is an outgrowth of the early fabrication experience with electromagnetic equipment.

Mr. Williams stated that the Y-12 plant, which supplies fabrication service for almost every AEC contractor, manufactures precision parts from many difficult and unusual metals. For instance, practically any metalworking operation which is feasible with ordinary metals is possible with uranium and its alloys. Massive tungsten parts, with high strength and some ductility, are possible.

The problem of metal stability, when working on a massive scale, with unusual metals and alloys, and when fabricating to tolerances an order of magnitude tighter than normal industry standards, is one which has not been solved. It is expected that significant research support will continue to be needed to develop the new methods required for this industry.

An example of the type of applied research carried out at the Y-12 plant was described by Fred Pohlhemus, development engineer for Union Carbide Nuclear Co. Explosive forming is a method for applying high energy rate operations to metal forming jobs. Unusual results have been reported by many investigators who have used explosives in forming of metals. Much work has been done on many common materials, but work on the unusual and exotic metals has not been reported to date.

Mr. Pohlhemus showed slides of metal forming applications suitable for explosive techniques. Included were direct forming, punching, fastening, engraving, bulging, welding, compacting of metallic and ceramic powders and surface hardening.

Mr. Pohlhemus cautioned, however, that explosive forming is not the cure for all metal forming troubles. It has its own particular limitations and will serve best when considered to be what it really is—simply another new and important tool in the metalworking field.

CHAPTER BRIEFS

• J. H. Shoemaker, president, Kolene Corp., described a unique new process of nitriding before the **Montreal** Chapter. Because of the nature of the surface produce, being tough rather than hard, the process is called "Tufftriding". His address was accompanied by a film with magnetic filmo sound taken in West Germany which showed the nitriding process which Mr. Shoemaker's company is introducing throughout the United States. *(Reported by A. J. Moore.)*

• The **St. Louis** Chapter, at a joint meeting with the local ASTME chapter, heard G. Herbert True, vice-president, Visual Research, Inc., speak on "Ideals Make Men Great". More than 190 persons attended the dinner meeting. Dr. True proposed that, by rearranging our thinking, we can help ourselves to come up with new concepts and ideas. *(Reported by D. E. Murray.)*

• "Choosing the Right Steel for the Job" was the subject of a talk by E. A. Jonas, Bethlehem Steel before the **Tulsa** Chapter. "Skylines", a film which offered historical and general interest background on the history and application of structural steels, was shown at this meeting. Mr. Jonas followed the film with a discussion of the six ASTM carbon and high-strength construction steels in widest use, comparing them from the standpoints of mechanical and chemical properties, weldability, corrosion resistance and price. *(Reported by Bob Kerwin.)*

Diploma Program Authorized

An extension diploma program has been authorized by the ASM's Board of Trustees for Metals Engineering Institute, the Society's home-study division.

The MEI Extension Diploma will be awarded for completion of a prescribed sequence of five of the more than 20 metallurgical courses offered by the Institute. The diploma program considerably enhances the value of MEI training and, in fact, provides a greater degree of metallurgical training than that held by the average metallurgical technician.

Diplomas will be awarded initially in four course work sequences: Ferrous Metallurgy, Welding Metallurgy, Nonferrous Metallurgy and Metallurgical Processes. Two additional diplomas are in the advanced planning stage: Foundry Metallurgy and Physical Metallurgy.

More than 2500 students have completed individual courses offered by the Institute during its four years of operation. An additional 2500 are currently enrolled in course work.

(1) A. R. Putnam, ASM managing director, presents the charter of the Beaver Valley Chapter to chairman M. S. Allshouse, Jr. (2) Samuel Epstein, Bethlehem Steel Co., spoke on "Aging in Iron and Steel" at the Rochester Chapter. Shown, from left: F. Gerhrlein, Russell Brush, chairman, Mr. Epstein and James Brown. (3) Carl E. Swartz, ASM vice-president, who spoke on "Continuous Casting" at Upper Ohio Valley, demonstrates a point in his talk. (4) Included on the Chicago Chapter's panel on "Constructional Steels" were J. H. Greenberg, chairman; W. Snyder, American Motors Corp.; R. Blom, Ladish Co.; M. W. Maxson, U. S. Steel Co., and A. P. Rasmussen, technical chairman. (5) Harry C. Burnett presents an appreciation certificate to John A. Bennett, National Bureau of Standards, who spoke on "What the Metallurgist Is Doing About Fatigue" at Washington. (6) A. L. Hodge, associate development manager, Linde Co., who spoke on "Oxygen in Steelmaking" at Wilmington. (7) At the Local Night Meeting of the Baltimore Chapter were, from left: J. White, second vice-chairman; G. Hinton, vice-chairman; R. J. Harkel, chairman; Julian M. Spencer, chief engineer, Sparrows Point plant, Bethlehem Steel Co., the speaker; Brooks Robinson, Baltimore Orioles third baseman; and W. H. Redden, publicity chairman

Metallographic Techniques Reveal Reasons for Plastic Deformation

The employment of skillful metallographic techniques during the past decade has shed much light on the nature of dislocations, according to W. G. Johnston, General Electric Research Laboratory, speaking before the **Tri-City** Chapter. This new realm of investigation has confirmed that dislocations are responsible for the plastic deformation in crystals.

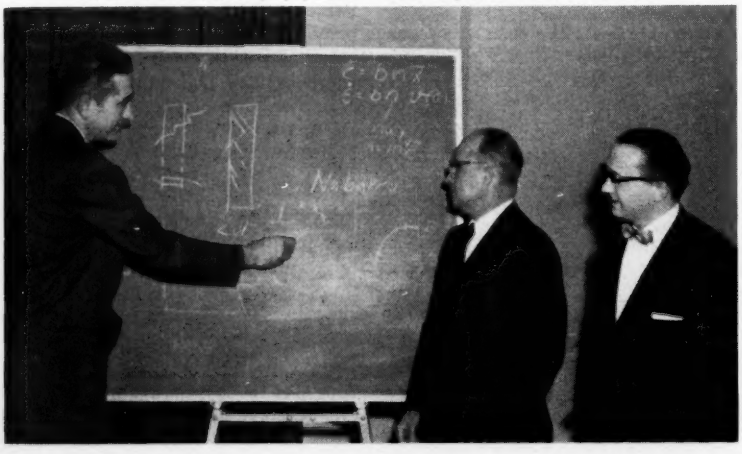
The four most commonly used techniques for observing *individual* dislocations are dislocation etch pits; decoration of dislocations in transparent crystals with precipitate particles; electron microscopy of thin foils; and X-ray diffraction. The etch pit method is the simplest of these techniques, and can be used for studying dislocations in large specimens that can be tested mechanically. Using the etch pit technique, the motion of a dislocation can be followed in a single crystal as the crystal is repeatedly stressed, each progression being revealed by a new etch pit. As the applied shear stress is increased, the average velocity of dislocation motion increases. Measurements of average velocity have ranged from effectively zero to near the speed of sound.

The number of dislocations in a crystalline substance has been found to be a function of strain, the number being vastly increased by plastic deformation. The manner in which the large numbers of dislocations are formed has been investigated by etching. A single glide dislocation moving through a crystal produces other dislocations on nearby planes by a regenerative mechanism, so that a wide glide band is formed.

The information obtained on mobility of individual dislocations and on the numbers of dislocations present at various stages of the deformation have been combined to correctly predict the stress-strain behavior of a large crystal.

The role played by dislocations in the strength of metals and alloys is not yet completely understood because some of the quantitative aspects of dislocation behavior are not entirely understood. In particular, it is necessary to understand what provides the resistance to dislocation movement in various crystalline materials. (*Reported by Henry L. Strieder.*)

W. G. Johnston (left) illustrates a point in his lecture



Nuclear Power Station Requires Welded Structure

Rapid progress made by the welding industry made possible the "boiling water reactor" of the Dresden Nuclear Power Station, William R. Smith, General Electric Co., told members of the **Lehigh Valley** Chapter. Speaking on "Material and Welding Applications", Mr. Smith pointed out that because a nuclear power plant requires a high degree of integrity and freedom from maintenance problems, an all-welded system is necessary.

Many different metals were utilized in the building of the station, including carbon and alloy steels, various stainless steels, Monel, copper-nickel, Muntz-metal, Admiralty-bronze and Zircaloy-2.

The heart of the station system, namely the reactor vessel, has a 12 ft., 2 in. I-D., is about 42 ft. high, and weighs about 350 tons. It is fabricated of manganese-molybdenum steel, internally clad with $\frac{3}{8}$-in. thick austenitic stainless steel. The "fuel" consists of pellets of UO_2 about $\frac{1}{2}$ in. round by $\frac{1}{2}$ in. thick. A series of these pellets is contained in a Zircaloy-2 tube to produce a rod 28 in. long. Four of these segments are connected together to form a basic 9 ft., 9 in. rod. Each fuel assembly consists of 36 of these rods encased by Zircaloy-2 in a square channel. The core consists of 488 fuel assemblies.

The 80 control rods, cruciform in cross section, are austenitic stainless, nominally 18% Cr, 12% Ni, containing 2% natural boron as the nuclear poison material, and are located about 10 in. apart within the central region of the core. The other assemblies of the station consist of conventional equipment.

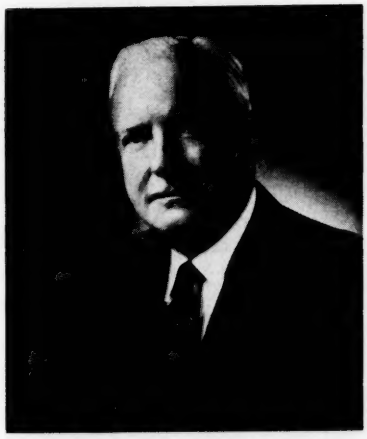
Quality control was an important part of the project. All applicable codes were strictly adhered to, all pressure-holding welds were radiographed, ferritic welds were magnetic-particle inspected and austenitic welds were fluid-penetrant inspected. The tube bundles of the steam generators and heat exchangers were checked for leakage with a helium mass spectrometer and all vessels were hydrostatically tested. Fuel rods are tested for leaks, welds are radiographed and segments are autoclaved at 750°F. and 1500 psi. for 72 hr. to check corrosion resistance of the Zircaloy-2 jackets. (*Reported by Bernard J. Fischer.*)

Steel Founders Celebrate 100 Years of Progress

Last January, the Steel Founder's Society of America met at the Franklin Institute in Philadelphia to commemorate the introduction of steel casting to America. According to the main speaker at this centennial program, Wilson H. Moriarty, president of the Society, "The first 100 years are the hardest". Back in 1861, a small company known as the Buffalo Malleable Iron Works poured the first steel castings in the United States, their first customer being then, as now, the largest customer—the railroads. Though steel for these first castings was melted by the crucible method, a trend for larger and larger castings set in almost im-

mediately, and by 1869 steel was being made in the openhearth. With the problem of sufficient capacity being solved by this new method for melting, the steel casting industry was on its way.

Though large tonnages were not the rule at that time, a swing to



W. H. Moriarty

steel was becoming noticeable—in 1880, nearly 2,000,000 tons of steel was produced, and by 1890 this had increased to 4,250,000 tons. As time passed, new markets opened for steel castings; in 1883, the steam shovel was invented, in 1884, the steam turbine appeared on the scene, and in 1888 the first steel rolls were cast.

By the turn of the century, some 85 firms were producing over 175,000 tons of steel castings every year. With such a rapid growth in a short 40 years, it was only logical for the many companies to stand as one—and so 1902 saw the formation of the Steel Founder's Society of America. Since that day, the various members have endeavored to live up to their fine motto: "Integrity — Research — Progress". This was stressed by Mr. Moriarty, who, in concluding his talk stated, "Our past, then, pledges us to a future of serving industry—great and small—for another 100 years".

1961 Southern Metals Conference To Be Held April 24, 25, and 26

The ASM is again sponsoring a three-day session for all metal users, designers and fabricators in the South. In addition to a Metals Congress which will present papers of interest to practical as well as research-minded people, the Conference for the first time will include an Industrial Exposition. Many southern firms which do not exhibit nationally will be there, ready to discuss new ideas, exchange engineering information and demonstrate new equipment and processes.

The technical program for the Conference will include the subjects outlined below.

INDUSTRIAL SESSIONS

1. **Iron and Steel Industry.** New steelmaking processes, continuous casting, induction melting, production of rimmed steel and nodular iron.
2. **Toolsteels and Heat Treatment.** (Co-sponsor, local chapter of American Society of Tool Engineers.) Tools and toolsteels, toolsteel applications, design and heat treatment of toolsteels and heat treatment of ultra-high strength steels.
3. **Forming and Welding of Ferrous Materials.** (Co-sponsor, local chapter of American Society of Tool Engineers.) General forming problems, explosive forming, forming of PH stainless steels, welding problems and new welding processes.
4. **Application and Fabrication of Nonferrous Metals and Alloys.** Review and lastest interests in nonferrous metals and alloys, extruding and extrusions of aluminum alloys, a new aluminum welding process, titanium, beryllium and refractory metals.
5. **Corrosion and Electroplating.** Corrosion mechanisms, oxidation and liquid metal corrosion, factors in corrosion of stainless steel, cathodic protection, hard-chromium plating, flame spraying and protective coatings.
6. **Nondestructive Testing.** (Co-sponsor, local chapter of the American Society for Nondestructive Testing.) Radiography, ultrasonic testing and magnetic particle inspection.

RESEARCH IN METALS AND MATERIALS

1. **X-Ray Diffraction and Microscopy.** (Co-sponsor, Atlanta Diffraction Society.) Study of thermal vibrations in quartz and aluminum, orientation in thin films, residual stress measurements, measurement of hardness by X-ray diffraction, electron diffraction and microscopy studies of oxidation.
2. **Basic Studies of Materials.** Study of fracture, fracture induced by liquid metals, metals as metal films, sintering studies and thermo-electric materials.
3. **Applied Studies of Materials.** Cryogenic considerations, ceramics, cermets, composite structures, precious metal plating, materials for space vehicles.

In addition to the technical program, a series of plant tours is planned, including visits to the Georgia Tech Experiment Station, Lockheed (Marietta and Dawson Reactor) and Atlantic Steel Co.

"Metallogram" Movies—A series of technical movies on all phases of ferrous and nonferrous production, design, fabrication, welding and use will be held concurrent with the technical program. Movies will be scheduled so as not to provide a conflict of interests.

The Conference committee includes R. F. Hochman, general chairman; R. B. Belser, program; P. J. Duffy, publicity; E. L. Smith, finances; A. R. Boyd and J. E. Butler, arrangements.

Program and registration forms will be distributed to all members of the 13 southeastern chapters. Any questions regarding to the program or the exposition should be directed to:

Dr. Robert F. Hochman,
Southern Metals Conference
Chairman
c/o Chemical Engineering Dept.
Georgia Institute of Technology
Atlanta 13, Ga.

P. Unterweiser, Idea; John Duzs, Artist

Making Stainless Useful

Stainless steels are the result of some of the most intensive research conducted by metallurgists everywhere in the world. This research, which had its beginnings in the late 1800's, led to the first commercial production of high-chromium alloys around 1910. From this infancy stainless steels have expanded today to a group of more than 40 standard types officially recognized by the AISI and probably that many more nonstandard or proprietary grades.

F. Kenneth Bloom, manager, Baltimore Laboratory, Research & Technology, Armco Steel Corp., in a talk on "Applications of Stainless Steel" before the **Boston** Chapter, traced the origin and development of the principal standard grades, the metallurgical principles which lie back of their development and how their compositions have been manipulated to produce useful combinations of mechanical properties, corrosion resistance and other special qualities.

An important factor in the selection of iron-base high-chromium stainless steels is the effect of chromium on impact toughness. Many years ago, it was found that, as the chromium content was increased from 14 to 18%, there was a sharp loss in impact strength at room temperature. Since the presence of a notch may result in brittle failures, the applications of very high-chromium alloys, such as types 442 and 446, particularly in welded structures, have tended to be limited.

One of the most important developments in chromium-nickel stainless steels occurred in 1945 when melting practices and techniques which allowed the carbon to be lowered to a maximum of 0.03% were perfected. This carbon content is low enough to effectively prevent carbide precipitation during welding. Another factor of considerable metallurgical importance in the application of austenitic stainless steels is the characteristic high strength exhibited at elevated temperatures. This property is further enhanced by additions of molybdenum and columbium.

One of the most interesting chapters in the history of research on stainless was the development of the precipitation-hardening alloys to meet the need for a material with as high a level of strength as heat treatable chromium alloys and a level of corrosion resistance approaching that of austenitic chromium-nickel types. This type was also developed to respond to low-temperature heat treatments to overcome problems of scaling and distortion.

Stainless steels, in general, are extremely versatile alloys and their properties can be adjusted and tailored to meet a wide variety of applications. This versatility is the major reason for the tremendous growth in their usage over the past 25 years. There is every reason to expect a continued high rate of growth for a number of years to come. *(Reported by Alexander F. Sherys.)*

Vacuum Metallurgy Techniques for Magnesium and Low-Carbon Ferrochrome

Vacuum metallurgy plays an important role in our satellite and nuclear projects. This metallurgical process and how it is used to produce high-purity magnesium and low-carbon ferrochrome was described by George Fegan, production manager of Pacific Northwest Alloys, Inc. at a meeting of the **Oregon** Chapter.

Three types of vacuum pumps may be used to achieve the necessary vacuum. They are mechanical positive displacement types, steam jet ejector and oil diffusion pumps. The mechanical pumps are adequate for vacuums required for simple heat treating of iron and steel at 25 in. of Hg., whereas the oil diffusion pumps work best at pressures under 10 micron, such as in extraction of high-purity uranium, titanium and zirconium. The steam ejector operates on the same principle as the oil diffusion pump but has different ranges of application, working best in pressures from 0.1 mm. to 100 mm. absolute.

Pacific Northwest Alloys used 32 steam ejector pumps for their 432 vacuum furnaces. Many of these pumps are multistage to increase their ultimate vacuum range. Automatic controls and a self-testing system were incorporated so that any trouble occurring was quickly isolated and determined by the trouble lights on the operation panel.

The "Pigeon" process, in which the magnesium is removed from the gangue of the ore, is also used. The reduced magnesium is vaporized and flows into a cold zone where it condenses back to a solid without going through the liquid phase. Ferrosilicon is the most economical form of silicon metal to use in making magnesium and the iron in the ferrosilicon helps stabilize the reaction. The reaction takes place at 2000°F. and 75 to 100 microns absolute.

In the production of low-carbon ferrochrome, many problems arose as to the most economical method to use while still maintaining the low-carbon content required in high-chromium alloy steels. SiO_2,

"CHOOSING THE RIGHT STEEL FOR THE JOB" *was the talk given by E. A. Jonas, Bethlehem Steel Co., at Tulsa. Shown, from left: Al Marks, past chairman, Mr. Jonas, and John Garol, chairman*

ZnO_2 and Fe_2O_3 were considered. Of these, Fe_2O_3 was found to be the most economical and is being used for the large percentage of vacuum refined low-carbon ferrochrome produced in this country.

The actual processing is accomplished at pressures from 0.1 to 10 mm. absolute and 2200°F. This reaction is pressure-temperature-time sensitive so that extreme control of vacuum is necessary. Accurately measured mixtures of high-carbon ferrochrome and Fe_2O_3 fines are placed into the vacuum furnace where the chemical reaction and sintering processes occur. The result is a low-carbon ferrochrome block that has many small pores. This property yields greater solubility in melt than duplex low-carbon ferrochrome. This results in short heat time and higher chromium recovery. *(Reported by Bruce L. Wong.)*

Theory, Applications and Control of Furnace Atmospheres

The basic chemistry of furnace atmosphere was outlined by Charles A. Mueller, Lindberg Engineering Co., at a meeting in **Wichita** to show the reactions that occur between the atmosphere and the steel during heat treatment. The reactions that occur between the furnace gases themselves were also described.

Originally, furnace atmosphere was used to minimize scaling and decaurburization during heat treatment. In addition, many other beneficial uses have been found, such as gas carburizing, carbonitriding, nitriding, sintering and reducing of powdered metals, bright hardening, annealing and carbon restoration.

The carbon equilibrium that exists between the furnace atmosphere and steel during heat treatment was illustrated by slides showing this relationship in the case of straight carbon steel, production steels and toolsteels of all types. Generally speaking, the equilibrium data showed that progressively lower dewpoint temperatures of endothermic atmospheres are required when either the carbon content of the steel is increased or when the temperature of heat treatment is increased. Alloying greatly influences the atmosphere requirements for equilibrium.

The operating characteristics and economics of different type atmosphere generators were discussed. These included the older type charcoal generator, exothermic, endothermic, dissociated ammonia and nitrogen generators. The comparative costs of producing each of these atmospheres, their particular fields of application and their composition were given. The endothermic atmosphere generator is the basic type in common usage today; it is used for neutral heat treating and as the carrier atmosphere in gas carburizing and carbonitriding. Generator control instrumentation has been perfected to such a degree that it is now possible to pre-select and automatically maintain precise carbon potential conditions in the furnace. In most cases a high hydrogen atmosphere produced from dissociated ammonia can replace the more costly cylinder hydrogen used in heat treating. A special example of the use of dissociated atmosphere was given as the sodium hydride descale bath which utilizes the hydrogen constituent of the atmosphere to react with molten sodium to form sodium-hydride. Other applications include the bright hardening and bright annealing of stainless steel.

Examples of surface treatment to secure particular effects were described, including carbon restoration and nitriding. The importance of prior treatment and surface condition in some applications of controlled furnace atmosphere was stressed.

The fundamentals of atmosphere furnace construction were outlined; gas-tight welded steel shells, door curtains, inlets and vent lines for atmosphere, atmosphere circulation in the furnace and methods to minimize room air infiltration were described. In the selection of furnaces for controlled atmosphere work, there are certain important features which should be considered, such as the capacity of the generator, furnace shell construction, choice of refractory lining materials and auxiliary handling equipment. Many types of controlled atmosphere furnaces were illustrated and their advantages and uses discussed. Among these was the large gantry-type furnace and associated equipment used in the heat treatment of missile bodies and components. These giants of the furnace industry are many stories high, but can be controlled mechanically, thermally and with respect to atmosphere, as closely as the more familiar types.

IMPORTANT MEETINGS

Mar. 20-24 — American Society for Metals, Western Metal Congress and Exposition, Los Angeles, Calif.

Mar. 21-23 — American Power Conference, Sherman Hotel, Chicago, Ill. (Information from James Stathas, Illinois Institute of Technology, Technology Center, Chicago 16, Ill.)

Mar. 23-24—Alloyd Electronics Corp., Third Annual Symposium on Electron Beam Technology, Boston, Mass. (Information from R. Bakish, Chairman, 37 Cambridge Parkway, Cambridge 42, Mass.)

Apr. 4—Atomic Energy Commission, Symposium on Uranium Carbides as Reactor Fuel Materials, AEC Headquarters, Germantown, Md. (Information from Industrial Cooperation Branch, Div. of Reactor Development, U.S. Atomic Energy Commission, Washington 25, D.C.)

Apr. 17-21—Short Course on Strain Gage Techniques, San Antonio, Tex. (Information from M. M. Lemcoe, Southwest Research Institute, Box 2296, San Antonio, Tex.)

May 9-11—Material Handling Institute, Eastern States Show, Trade and Convention Center, Philadelphia. (Information from R. B. Woolery, Registration Chairman, P. O. Box 9562, Frankford Station, Philadelphia 24)

May 17-19—Society for Nondestructive Testing, Eastern Regional Meeting, Mount Royal Hotel, Montreal, Canada. (Information from Maurice Daly, SNT, 2168 Addington St., Montreal 28)

June 12-23—Illinois Institute of Technology, Summer School in X-Ray Diffraction Analysis. (Information from Prof. L. V. Azaroff, Illinois Institute of Technology, Technology Center, Chicago 16, Ill.)

June 19-23—Pennsylvania State University and American Carbon Committee, Fifth Biennial Conference on Carbon, Penn State. (Information from D. S. Coleman, Conference Coordinator, Pennsylvania State University, University Park, Pa.)

June 20-24 — Fourth International Powder Metallurgy Congress, Reutte, Tyrol, Austria. (Information from Henry H. Hausner, 730 Fifth Ave., New York, N.Y.)

MEN in METALS

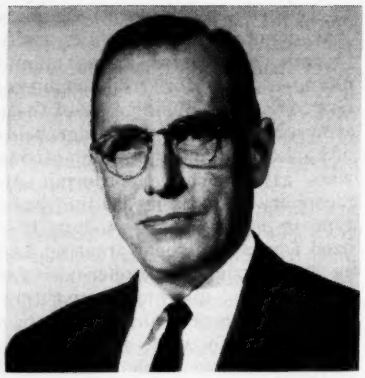
W. G. Kirkland and R. E. Paret have been elected assistant vice-presidents of the American Iron and Steel Institute. Mr. Kirkland's duties will be in the field of building research and technology, Mr. Paret's in the promotion of the uses of steel.

WaiMet Alloys Co., Howe Sound Div., reports that Jerry Grott, manufacturing manager, assumes additional duties as technical manager, replacing Bill James who has resigned to go with Centrifugal Casting Co. John Fritz, materials manager, assumes additional duties as assistant manufacturing manager, George Haley becomes supervisor, quality control.

Hevi-Duty Electric Co., a division of Basic Products Corp., has appointed Raymond G. Nordstrom to the newly created post of executive vice-president, with responsibilities primarily for the marketing function. Nordstrom formerly served as executive vice-president and general manager of Reflectal Corp., a subsidiary of Borg-Warner. He holds a fellowship in metallurgy from the Royal Institute of Technology, Stockholm, Sweden, and a B.S. degree in metallurgy from University of Pittsburgh.

Marvin L. Billow has joined National Forge Co. as marketing manager of special products. He was formerly director of marketing services and director of market research for Aluminum Extrusions.

Bristow Guy Ballard, vice-president (scientific) of the National Research Council, has been elected president of the Engineering Institute of Canada for 1961-62. Dr. Ballard has been associated with the Institute since 1931.



H. J. PUGSLEY, SENIOR VICE-PRESIDENT, *Swindler-Dressler Corp., a subsidiary of Pullman Inc., was elected president of the Industrial Heating Equipment Association at the winter meeting in Dearborn, Mich. Elected vice-president was T. H. Wickwire III, president of Trent, Inc. Roy Snyder, treasurer of W. S. Rockwell Co., was re-elected treasurer, Robert E. Fleming was re-elected executive vice-president. New directors are Mr. Wickwire, M. R. Ogle, sales manager, Drever Co., and G. C. Wilsher, vice-president — engineering, Holcroft & Co. Retiring president is W. E. Benninghoff, Ohio Crankshaft Co.*

Vac-Hyd Processing Corp., Detroit, has appointed Ross Browning as midwestern district sales manager. With the company for four years, Mr. Browning previously served in a technical capacity.

William F. Eberly has been made manager of the Cleveland district for Vanadium-Alloys Steel Co. He succeeds T. M. Millison who retires after 33 years of service in the company's sales department. Everly has been with Vanadium for the past ten years as a sales representative in the Cleveland and Philadelphia area.

Laurence F. Granger has been named advertising manager for National Carbon Co., Div. of Union Carbide Corp. He has been active in advertising and public relations work with Union Carbide for the past 23 years.

John F. Goron has been named assistant director of sales and Frank P. Collins has been appointed sales manager for the New York district by Allied Chemical's Barrett Div.

Thomas K. Brunner has been made sales manager of Rockwell-Standard Corp.'s Grating Div., Gary, Ind. He was previously sales representative in the Chicago area.

R. R. Baker has been appointed a director of Pullman-Standard's international sales department. He comes up from export sales manager into this newly created position.

Allegheny Ludlum Steel Corp. has appointed managers for the regional Carmet sales districts recently set up by the company. They are Vincent T. Kepler, Atlantic District, Vaux H. Adams, Central District, with headquarters in Detroit, and Howard L. Ludeman, Midwest District, with headquarters in Chicago.

Fred J. Robbins, Los Angeles, has been elected president and chief administrative officer of Bliss & Laughlin, Inc. He succeeds Arthur Lehr who died late in October. The new vice-president has been vice-president in charge of B & L's Pacific Coast operations since February 1960 when B & L acquired Sierra Drawn Steel Corp. Robbins founded Sierra in 1947, serving it continuously as president. Robbins completes a cycle started in 1936 when he joined B & L as a metallurgical engineer. He remained seven years, resigning in 1943 to go to Plomb Tool Co., now Pendleton Tool Industries, Inc. He left Pendleton as vice-president in 1959 to devote full time to Sierra Drawn Steel.

Harry Berger, manager of Alside, Inc., Akron, Ohio, has been promoted to an executive sales position to assist in sales direction of northeastern sales.

James M. Hughes has been appointed sales manager, regular products, of the Dresser Manufacturing Div., Dresser Industries, Inc. He will direct the promotion and sales of all Dresser pipe joining and pipe repair products.

D. W. Kaufmann has been appointed product manager of stainless steels by the Crucible Steel Co. of America. He will be responsible for vacuum melted high-temperature alloys, super-alloys and titanium.

Mr. Kaufmann joined Crucible after graduation from Penn State in 1940 with a degree in metallurgy. Beginning in Crucible's Harrison, N. J., research lab, he moved to the Sanderson-Halcomb Works in Syracuse, N.Y., in 1941. After a series of metallurgical positions of increasing responsibility, he was moved to the central metallurgical department in Pittsburgh in 1950. During Crucible's joint ownership of Rem-Cru Titanium, Inc., Mr. Kaufmann served with that company, from 1953 to 1957, advancing from assistant sales manager to manager of marketing. When Crucible acquired complete ownership of Rem-Cru he was appointed product manager of the titanium division. In 1958 he assumed responsibility for sales of vacuum melted products and, in 1959, he became product manager of toolsteels.

Jefferson D. Keith has been appointed managing director of the Pressed Metal Institute, national trade association for manufacturers of metal stampings, with headquarters in Cleveland. Mr. Keith served most recently as administrative assistant for the American Pulpwood Assoc., and served in similar capacities with the National Petroleum Assoc. and W. A. Penrose & Assoc., professional managers for a number of national trade associations.

New sales manager of the Avionics Div., Calbest Engineering and Electronics Co., is Ted T. Hooper, formerly co-ordinator and sales engineer for Culver Hydro Press Inc.

Carl L. Hiltrop has been named assistant professor of chemistry at Colorado School of Mines. He has been at Mines since August, 1960, studying as a post-doctoral fellow sponsored by the National Science Foundation. He will teach physical chemistry and geochemistry.

Andrew F. Gencur has been named assistant sales manager-Finished Products Div., Detroit Stamping Co. Mr. Gencur has been with the company for 30 years.

J. W. Finch, former manufacturer's representative in the Southern California area, has been made sales manager of the Convair Instruments facility of Convair Div., General Dynamics Corp.

Earl A. Garber has been elected chairman of the board of Harbison-Walker Refractories Co., and A. Brent Wilson has been made president to fill the vacancy created by Mr. Garber's elevation.

New chief product engineer at the Electric Autolite Co.'s Decatur, Ala., operations is James L. Gage, formerly chief engineer, ignition and controls, at the company's engineering headquarters in Toledo.

Kenneth R. Beardslee will retire Apr. 1 as consultant to the Metallurgical Products Dept. (Carboloy (R) of General Electric Co., Detroit). He has been in the organization nearly 31 years.

Obituaries

William L. Badger, manager of the Thomson Laboratory, Small Aircraft Engine Dept., General Electric Co., and chairman of the Boston Chapter during the 1952-53 season, died in Lynn, Mass., early in January. Mr. Badger helped develop the nation's first jet engine and assisted in perfecting the turbo supercharger which enable planes to fly at high altitudes.

The Rev. Roysel J. Cowan, chief metallurgist for Surface Combustion Div., Midland-Ross Corp. from 1927 until he joined the ministry in 1941, died in January at the age of 75.

George P. Baumunk of St. Louis has been appointed vice-president, commercial, of Washington Steel Corp., Washington, Pa. Mr. Baumunk, for the past 13 years a vice-president of Metal Goods Corp., will have charge of sales, market research, product development, sales promotion and advertising.

The appointment of Frederick C. Arnold as manager of the Ontario Region, Liquid Carbonic Canadian Corp. Ltd., has been announced. Prior to his present appointment he had been associated for 12 years with the welding division of the Westinghouse Electric Corp. in several locations throughout the U.S., most recently at the New York regional headquarters and previously as regional sales manager, San Francisco and St. Louis.

Latrobe Steel Co. has named Edwin F. Kruzynski as manager of its production control department. He will be in charge of production scheduling and coordination of production operations with requirements for finished products. He was promoted from the position of supervisor-production scheduling.

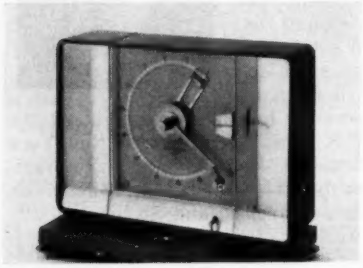
Daniel Gray, research chemist credited with changing indium from a laboratory curiosity to a commercial metal, has been appointed special consultant of technical problems by Alpha Metals, Inc., Jersey City, N.J. It was Mr. Gray's substitution of common sugar for rare and costly amino acetic acid that made indium plating a commercial practically.

Before joining Alpha, Mr. Gray was a research chemist with Oneida, Ltd. for 42 years. He occasionally interupted this tenure to work on special chemical projects such as the one on indium.

RESEARCH
R & D NEWS
DEVELOPMENT

Precision Balance

The "Model L" balance used in research and quality control work features simplicity, accuracy and speed of operation. For rapid, repetitive weighings, the balance has a lock and release lever that permits the beam to be locked at any point, regardless of index pointer position. Magnetic damping brings the beam to reset quickly. The balance, of double-hook design, has a low range of 0-3 mg. and a high range of 0-50



grams. A counterweighing mechanism allows loads up to three times scale to be weighed.

Accuracy in the balance is insured with ±1/10 of 1% by sapphire ring jewels. A micrometer adjustment enables zero settings to be made before each operation. Applications for this precision balance are to be found in surface tension testing, cathode weighing, geochemistry, chromotography, microbiology, spectrographic preparations and moisture testing.

For further information write: Federal Pacific Electric Co., 50 Ave. L, Newark 1, N. J.

Isodynamic Separator

The "Model E-1" should be useful to ferrous metallurgists in separating predominantly ferromagnetic mixtures. This has always been difficult because magnetic particles tend to agglomerate, trapping nonmagnetic particles. In the E-1 separator, a mixture is fed down a vibrating chute, inclined sideways as well as forward. An alternating magnetic field gives the mixture fluidity. Nonuniformity of the magnetic field keeps magnetic particles to the higher side of the chute. With this efficient system it is possible, in one pass, to make a clean separation of a 95% sponge iron—5% gangue mixture.

For further information write: S. G. Frantz Co., 108 Kline Ave., Trenton 6, N. J.

Nuclear Thickness Gages

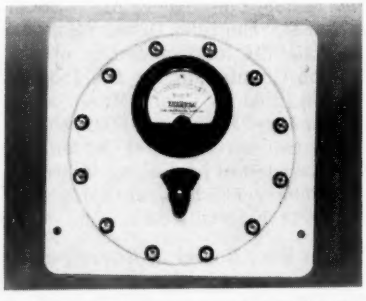
The "Micro-Meter", a noncontacting thickness-density gage, differs from present beta gages in that it utilizes a special scintillation detection technique. This permits the use of gamma or beta radiation and extends the range of application from tissue paper to a foot of steel. Sensitivity depends on the source selected. Gamma sources, with high penetrating power, allow measurements to within ± 0.001 in. of steel (equivalent); beta sources allow thin sheets and foils to be measured within a few microinches.

The high speed of response—down to 10 milli-sec.—permits high-speed inspection (with material moving 5000 ft. per min., a thickness change can be indicated before it has moved 1 ft.) The unit can be adapted to flaw detection in thick sections, such as hot steel blooms or nonferrous billets. Liquid levels can be indicated to within 1% of range being measured. The Micro-Meter can also be used in dimension gaging or in weighing small parts.

For further information write: Radionics Inc., Lafayette & Water Water St., Norristown, Pa.

Explosion Proof Thermocouple Gage

Designed for use in liquid oxygen or liquid hydrogen atmospheres, this gage is basically a

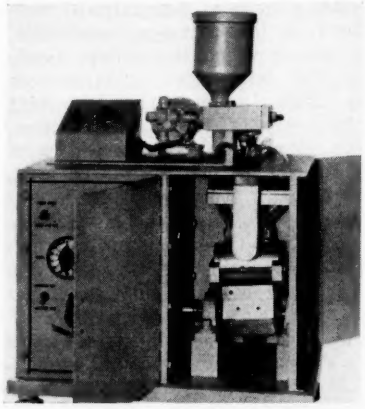


Televac meter in a hermetically sealed aluminum case. There is a threaded connection to the thermocouple gage tube located outside the case. The instrument is also suitable for use in explosive atmospheres generated in some vacuum metallurgy operations. It has a range of 1 to 1000 microns (0.001 to 1.0 mm.) Hg. The indicating meter is direct in microns and has a sensitivity of 12 millivolts at 1 micron. The operating temperature is compensated between 32 and 160° F.

For further information write: Fredericks Co., Bethayres, Pa.

Pulverizer for Laboratory Use

For accurate analysis by X-ray or emission spectroscopy, particle size and uniformity are important. Samples ground with this unit have a narrow range of particle sizes, with no large unground particles and a minimum of submicron fines, even with mixtures of hard and



soft compounds. Screens and an air stream remove particles of predetermined size from the grinding chamber as grinding proceeds.

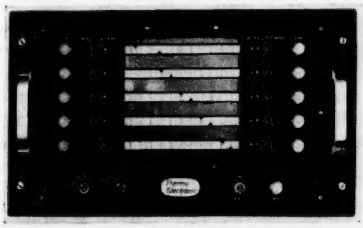
Coarse material up to 3/16 in. diameter is loaded into a cylindrical grinding chamber containing balls which is shaken at high speed. The low-pressure (8 to 15 psi.) air stream is reversed in direction at a rate of 200 times per min. This cleans the screens and also removes the particles to a collector.

For further information write: Pitschford Scientific Instruments Corp., 501 Castle Shannon Blvd., Pittsburgh 34, Pa.

Multi-Point Temperature Controller

This instrument provides accurate automatic two-position control for up to ten separate processes. It can also be used as a single-point controller, a five-point, three-position controller and a manual-bal-

ance indicator. Any points not used in controlling a multiple-temperature process can monitor other processes. The unit combines a sensitive null-balance potentiometer measuring circuit with an electronic control system and is adapt-

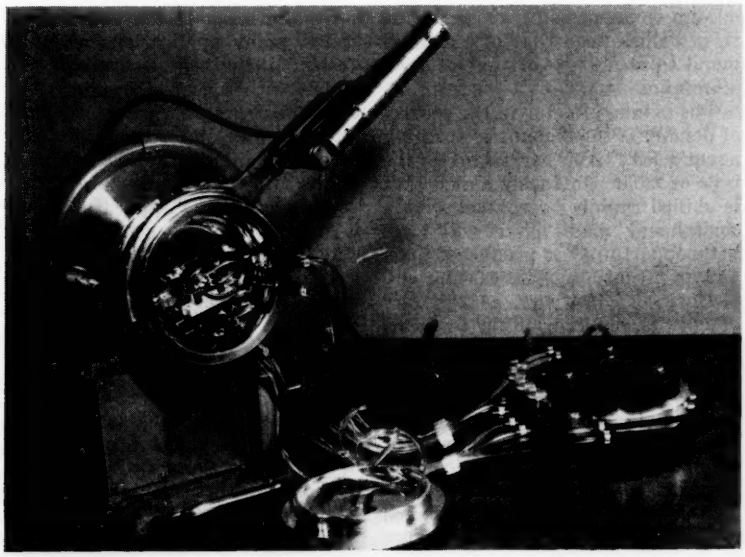


able to any installation requiring off-on control. Accuracy is 0.5% of range and standardization is continuous. In operation, input signals are scanned in sequence, at a rate of 3 sec. per point, and compared to slide-wire control settings. Amplified signal deviations provide corrective action through ten load relays. The ten white lights show screen position and the ten red lights show process conditions.

For further information write: Thermo Electric Co., Inc., Saddle Brook, N. J.

High-Temperature Diffraction Studies

This diffractometer attachment is used for high-temperature X-ray investigation of powder, wire or sheet specimens in vacuum or suitable atmospheres. The instrument consists of a removable water-cooled jacket and a base plate with furnace stand and platinum specimen mount. Two rotation controls and one translation control provide accurate alignment. The position of the specimen can be changed during the run without losing vacuum or temperature. The 40% rhodium-platinum furnace element permits operation in air at elevated temperature. It may be replaced with other heating elements, such as tungsten or tantalum. X-rays enter through and are diffracted out of two beryllium windows, which permit reflections from 0° to 160°. The instrument can be used with the Norelco wide-range diffractometer, the General Electric spectrogoniometer and the RCA horizontal diffractometer, Model MI-15409.



For further information write: Materials Research Corp., 47 Buena Vista Ave., Yonkers, N. Y.

ASM NATIONAL AND REGIONAL TECHNICAL MEETINGS

Western Metal Congress, Los Angeles, Calif., March 20-24, 1961

Tri-Chapter Conference, Troy, Ohio, Apr. 12, 1961— Progress in Metal Joining"

Indiana Symposium, Purdue University, W. Lafayette, Ind., Apr. 15, 1961 "Vacuum Metallurgy"

Pacific Northwest Metals and Minerals Conference, Spokane, Wash., Apr. 13-15, 1961

Chicago-Western Seminar, Chicago, Ill., Apr. 20, 1961 "Properties of Metallic Surfaces"

Southern Metals Conference, Atlanta, Ga., Apr. 24-26, 1961

Tri-State Conference, Bethlehem, Pa., May 19, 1961—"Efficiency in Metallurgy—Research, Quality, Control, Production"

National Metal Congress, Detroit, Mich., Oct. 23-27, 1961

Precious Metal Plating Affected by Base Metal

Deposition of continuous adherent precious metal coatings is greatly dependent on the physical and chemical properties of the base metal, according to Edward A. Parker, technical director of Technic Inc., speaking before a meeting held by the **Rochester** Chapter.

Rolled or drawn metal surfaces contain surface contamination, and while this can be removed by mechanical means, macro-type defects, such as small burrs, crevices and cold worked smeared metal may still prevent high-quality plating. For the highest quality plating with respect to coverage and adhesion, mechanically finished surfaces should be further prepared by etching or electropolishing to alleviate macro defects.

Chemistry plays an important part from the standpoint of inclusions caused by accidental or purposely added alloying agents. For example, lead added to brass for free machining purposes is easily smeared over the surface during mechanical finishing, and, unless removed by chemical or electrochemical methods, poor adhesion results.

Other inclusions, such as aluminum or silicon oxides, are nonconducting and therefore difficult to bridge.

High-quality requirements in electronic and transistor parts require extreme care in the plating operations and studies are continu-

ing to determine the origin and cause of plating difficulties. Because of the large number of factors that influence plating quality, bridging the gap from sample or low production requirements to high production is a problem requiring extreme care. *(Reported by L. M. Smith.)*

Explains Mechanisms of Brittle Fracture

The prevention of catastrophic brittle failure of materials in service requires an understanding of the mechanisms involved, according to R. W. Guard, General Electric Co., who was the guest speaker at a recent meeting held by the **Wichita** Chapter.

In almost all fracture processes, two steps must be considered—initiation of a crack and the propagation of the crack through the material. Where the fracture occurs because of service stresses, some of the processes involved can be defined in the following manner.

In ductile materials, the fracture process is initiated by local plastic yielding under conditions where large-scale plastic yielding is inhibited. This may be inhibited either by the presence of multiaxial stresses or by the presence of alloying elements or impurities. The propagation of a crack is controlled primarily by the amount of elastic energy available in the structure and the irreversible work of the fracture process. In ductile materials, this irreversible work is usually associated with local plastic deformation in the region of the propagating crack.

These factors can be examined in several typical cases. The question is often asked why tempered martensite is superior to pearlite. The reasons are related to the increase in the work of fracture. This increase is a result of a much smaller fracture unit which makes propagation difficult and a much higher yield stress of the material which causes higher energy absorption in fracture. This information leads us to the conclusion that we can expect deformation of the austenite to give finer and tougher martensite with further improvement in the fracture resistance as is known in the case of ausforming.

While there is no single cause for the observed "size effect" in large castings or forgings, the failure of these materials can often be coupled to the presence of transformation products with less fracture work associated and a very large amount of stored elastic energy available to propagate a crack.

In the fracture of brittle or quasi-brittle materials, where deformation during fracture is difficult, the propagation of cracks is the controlling step. In these cases, other methods of energy absorption (ductile binder phases) must be combined with structural designs which have lower amounts of stored elastic energy.

Continued work to improve our understanding of the mechanisms of initiation and propagation of cracks will undoubtedly improve our ability to avoid catastrophic brittle fracture. While it is unlikely that we can expect "ductile ceramics" for some time to come, it is not unreasonable that we can improve the fracture resistance of these materials substantially as we come to learn more and more about their behavior. *(Reported by R. E. Layton.)*

Foamed Metals Make Versatile Materials

In a talk on "Foamed Metals" presented recently before the **Utah** Chapter, L. F. Yntema, Bjorksten Research Laboratories, pointed out that, basically, the procedure for producing a foamed aluminum body consists of adding a foaming agent to a pool of molten aluminum, mixing thoroughly and pouring into a mold. The density of foamed aluminum thus formed may be varied from values near that of the solid metal to about 8% of that of pure aluminum.

The primary factor in the control of density is the amount of foaming agent used. Another factor is the type of mold. Obviously a melt that is chilled rapidly by contact with a cold, heavy metal plate will have little opportunity to produce a foam and an essentially solid casting will be formed. However, as the rate of chill is reduced, either by heating the metal mold or by substituting a material with lower thermal conductivity, such as sand or a ceramic, the solid wall formed in contact with the mold wall becomes thinner and a lower density casting is produced.

Most of the work in the foamed metal field has been on aluminum and its alloys. This is a light metal, the melting point is low; it has good mechanical properties; it is comparatively cheap; and it is comparatively easy to handle in the liquid state. Another consideration is that certain foaming agents, the gas producing materials, can be introduced at atmospheric pressure and the foaming reaction also proceeds at atmospheric pressure. Accordingly, work to date has dealt chiefly with aluminum and its alloys, having in mind, however, the foaming of other heavier high melting metals, such as copper and iron. These foams have been produced on a laboratory scale, but the emphasis on the aluminum systems has resulted in a technology that is ripe for commercial development.

An interesting and important characteristic of foaming metal is in its expansion. In a casting with a 2 x 8 in. cross section, a rise of 8 ft. has been observed. The density of the foam in the casting, measured in sections taken from top to bottom, is essentially constant. Another consideration inherent in this expansion is that a complicated mold will be filled.

There are many properties which make the use of foamed aluminum commercially attractive. The workability is good, it can be cast into thin sections (½ in.) and into large sections without warpage, it can be cut with a band saw or a hand saw, assemblies can be made by nails, screws, bolts, welding or by adhesives, it is a good insulator, it is resistant to corrosion, it is fire resistant and it is a very lightweight material.

On the basis of the above properties, many applications are suggested, including decorative wall panels with a cast-in design, small boat construction, furniture, shipping boxes and containers for fragile equipment, roof decking, trailer walls and many more.

Although many applications may be developed where a new material may be economically substituted for a material in current use, perhaps the most important consideration should be the completely new uses that can be made of a material by virtue of the property or combination of properties it possesses. When a new material becomes available, the development of entirely new uses presents an interesting challenge to the imagination. *(Reported by Ralph R. Hitchcock for the Utah Chapter.)*

CHAPTER MEETING CALENDAR

Albuquerque	**Apr. 20**	Hoyts Dinner Bell Restaurant	**R. A. Long**	New Developments in Honeycomb Brazing Techniques
Baltimore	**Apr. 15**	Western Electric Co.		Plant Tour
Birmingham	**Apr. 4**	Redstone Arsenal		Field Trip
Buffalo	**Apr. 13**		**R. F. Thomson**	What Metallurgical Engineering Can Do for Management
Calumet	**Apr. 6**	Martinque Restaurant		Ladies Night
	Apr. 15	Purdue Memorial Union		Indiana Symposium
Carolinas	**Apr. 14**	Raleigh	**John Wulff**	New Alloys and New Education
Cedar Rapids	**Apr. 10**	Roosevelt Hotel	**Leon Printz**	Powdered Metals
Chicago	**Apr. 10**	Furniture Club	**B. Hirst and J. T. McCune**	Quality Versus Production
Chicago-Western	**Apr. 20**	Illinois Tech	**Seminar**	Properties of Metallic Surfaces
Cincinnati	**Apr. 12**	Dayton (Tri-Chapter)		Progress in Metal Joining
Cleveland	**Apr. 3**	Engineering Society	**Panel**	Surface Treatment for Corrosion
Columbia Basin	**Apr.**		**A. Hurlich**	Materials Problems in Missiles
Columbus	**Apr. 5**	Christian Church	**Frank Richmond**	Ferrous Vacuum Metallurgy
	Apr. 12	Dayton (Tri-Chapter)		Progress in Metal Joining
Dayton	**Apr. 12**	Hobart Brothers (Tri-Chapter)		Progress in Metal Joining
Delaware Valley	**Apr. 19**	Hotel Stacey-Trent	**C. A. Johnson**	Hydrogen Reduction Process
Detroit	**Apr. 10**	Piemontese Club	**C. A. Siebert**	Temper Embrittlement
Eastern New York	**Apr. 11**		**V. J. Reilly**	Metal Processing
Fort Wayne	**Apr. 11**	Oil Steel Foundry		Tour
	Apr. 15	Purdue Memorial Union		Indiana Symposium
Golden Gate	**Apr. 19**	United Air Lines		Tour
Hartford	**Apr. 12**	Indian Hill Country Club	**C. P. Mueller**	Refractory Metals and Infab
Indianapolis	**Apr. 17**	Turners Club	**R. P. Daykin**	Impact Hammers and Forging Quality
Kansas City	**Apr. 19**	University of Kansas	**C. H. Lorig**	Metals for This Changing World
Los Angeles	**Apr. 20**	Rodger Young Auditorium	**L. D. Bradley, Jr.**	The Expert and the Professional Witness
Louisville	**Apr. 4**		**D. J. Blickwede**	New Developments in Steel
Mahoning Valley	**Apr. 8**	Union Carbide Metals		Plant Tour
Milwaukee	**Apr. 18**	Astor Hotel	**R. H. Aborn**	Toughness Without Tempering in Quench-Hardened Low-Carbon Plain and Alloy Steels
Minnesota	**Apr. 26**	Calhoun Beach Hotel	**J. B. Valentine**	Engineering Properties of Carbonitrided Cases
Montreal	**Apr. 3**	Queen Elizabeth Hotel	**W. R. Thomas**	Materials for Reactor Cores
Muncie	**Apr. 11**	Ball State Student Center	**O. H. Fenner**	Corrosion
	Apr. 15	Purdue Memorial Union		Indiana Symposium
New Hampshire	**Apr. 14**	Franklin, N.H.	**S. I. Roberts**	Welding of Aluminum
New Jersey	**Apr. 17**	Essex House	**C. P. Mueller**	Inert Atmosphere Fabrication of Refractory Metals
New York	**Apr. 10**	Brass Rail Restaurant	**Max Lightner**	History of an Alloy Steel
North Texas	**Apr. 6**			Progress in Aluminum
N.E. Pennsylvania	**Apr. 13**		**G. E. Pellissier**	Electron Metallography of Steel
Notre Dame	**Apr. 15**	Purdue Memorial Union		Indiana Symposium
Oak Ridge	**Apr. 19**	Holiday Inn	**J. E. Hilliard**	High Pressure Effects of Alloys
Ontario	**Apr. 7**	Beacon Hotel	**D. T. Taylor**	Modern Free Machining Leaded Steels
Ottawa Valley	**Apr. 4**	Charles Camsell Hall	**G. H. Enzian**	Uses of Oxygen in Modern Metallurgy
Peoria	**Apr. 10**	Ivy Club	**W. S. Pellini**	Materials Problems of Missiles Rockets and Space Vehicles
Philadelphia	**Apr. 28**	Schwarzwald Inn	**Panel**	Metallurgical Research in the Dept. of Defense
Phoenix	**Apr.**	National Malleable Co.		Field Trip
Pittsburgh	**Apr. 13**	Gateway Plaza	**Panel**	New Developments in Metal Removal
Purdue	**Apr. 15**	Purdue Memorial Union		Indiana Symposium
Quebec	**Apr. 11**	Voirie Club		Ladies Night
Rhode Island	**Apr. 5**		**Mervin Ault**	Materials, Key to Space Flight
Richmond	**Apr. 11**	Executive Motor Hotel	**C. H. Samans**	National Officers Night
Rochester	**Apr. 10**	Manger-Senaca Hotel	**W. A. Black**	Nondestructive Testing
Rocky Mountain	**Apr. 21**			Ladies Night
Saginaw Valley	**Apr. 11**	High Life Inn	**Al Welch**	Instrumentation for Modern Metallurgy
St. Louis	**Apr. 20**	Clayton Elks Club	**Morris Cohen**	
Sangamon Valley	**Apr. 20**	Springfield	**R. H. Aborn**	Toughness Without Tempering
San Fernando	**Apr. 25**	Glen Aire Country Club	**W. C. Hagel**	Aging Reactions in High-Temperature Alloys
Southeast Ohio	**Apr. 6**	Berwick Hotel	**C. P. Mueller**	Impact of Infab on Metallurgy
Springfield	**Apr. 17**		**Morris Cohen**	High-Speed Steel
Syracuse	**Apr. 14**	Onondaga Hotel	**H. Hubbell**	Bearing Materials
Toeldo	**Apr. 13**	Maumee River Yacht Club	**F. M. Richmond**	Vacuum Melted Steels
Tri-City	**Apr. 11**	Alloy Metal Products		Tour
Upper Ohio Valley	**Apr. 12**			Ladies Night
Washington	**Apr. 10**	Amer. Assoc. Univ. Women's Club	**P. C. Rossin**	Infab Inert Atmosphere Fabrication Facility
West Central Florida	**Apr. 13**	St. Petersburg		Do-All Show
Western Ontario	**Apr. 28**	Drop-In Tavern	**A. Nahori**	Steel—Quality Control
Wichita	**Apr. 10**			Joint Meeting With American Welding Society
Wilmington	**Apr. 12**	Fabian's Restaurant	**J. H. Westbrook**	Intermetallic Compounds
York	**Apr. 12**		**H. F. Reid, Jr.**	Progress in the Development of Coated Electrodes

EMPLOYMENT SERVICE BUREAU

Operated on a no-charge basis for A.S.M. members in good standing. Ads are limited to 50 words and only one insertion of any one ad. Address answers to: Box No.. American Society for Metals, Metals Park, Novelty, Ohio, unless otherwise stated.

POSITIONS OPEN

East

METALLURGICAL ENGINEER: Experienced in the handling of high-purity metals and their manufacture into various shapes and forms such as dots, disks, spheres or pellets as used in semiconductor manufacture. Ferrous and nonferrous metals. Metropolitan New York area. Send resume to Box 3-5.

CONTACT METALLURGIST: Established toolsteel distributor representing well-known Swedish mill needs a man for customer service and trouble shooting. Metallurgical and practical experience with toolsteels essential. Territory: New England and Middle West with home office in New York City. Please furnish full details of education and experience along with expected salary. Box 3-10.

Midwest

PHYSICAL METALLURGIST: Administer research activities of a metallurgical group engaged in a broad study of refractory metals and alloys within the corporate research laboratory of a diversified, multi-division manufacturer. Doctorate degree with up to seven years experience. Box 3-15.

West

RESEARCH METALLURGISTS: Challenging opportunities in combined contract research, teaching assignments in physical, nuclear and structural metallurgy and ceramics. Ph.D.'s desirable, but outstanding M.S. individual will be considered. Salaries open. Resumes should give academic and professional experience in detail. Send to: Metallurgy Div., University of Denver, Denver 10, Colo.

SENIOR MECHANICAL ENGINEER: Mechanical engineering degree or equivalent. Five to 15 years engineering experience. Experience should include intensive and detailed work in metal parts fabrication on multispindle screw machines, multistage eyelet presses and progressive die work. Salary is open and fringe benefits are excellent. It is a newly created position and our employees know of this opening. Box 3-20.

FELLOWSHIPS AND ASSISTANTSHIPS: Advanced degree students in physical metallurgy. Emphasis on phase equilibria, crystal imperfections, plastic deformation in alloys, ceramics and intermetallics. Applicants with degrees in the physical sciences or engineering will be considered. Fulltime summer research employment available. Contact: Dept. of Metallurgy, University of Denver, Denver 10, Colo.

POSITIONS WANTED

MECHANICAL ENGINEER: B.S. degree, research and development, metal forming, equipment design, product design, process research, manufacturing development. Background in project planning and administration. Creative, desires challenge. East preferred. Box 3-25.

TECHNICAL EXECUTIVE OR METALS DEVELOPMENT MANAGER: Excellent experience in research and manufacturing metallurgy extending to both ferrous and nonferrous products. Expert in basic steel processing, foundry products, heat treatment, welding, specialized metal joining, coatings, toolsteels, specialized machinery, aircraft products, tools and machining. Top-level supervisory experience. Patents. Location immaterial. Resume on request. Box 3-30.

METALLURGICAL ENGINEER: Completing requirements for M.Met.E. Five years experience in aerospace materials and welding metallurgy. Presently project engineer directing a team engaged in the application of advanced materials to re-entry and space vehicle environments. Desires similar position with leading aerospace-oriented firm. Location immaterial. Resume on request. Box 3-35.

TECHNICAL MANAGEMENT: Metallurgical engineer, graduate study, supervising laboratory, statistical quality control of raw materials, heat treatment, electroplating, mechanical properties, seeks permanent opportunity using more fully judgement and 18 years experience in product development, troubleshooting, corrosion control, all metallurgical processes in avionics manufacturing, also research. Desires aggressive company, New York City, Long Island. Box 3-40.

RESEARCH SUPERVISOR: Fifteen years in basic and applied metallurgy including nine years with present employer as research supervisor on reactive metals, involving alloy development, melting, special processing, heat treatment, coating and fundamental corrosion studies. Several papers and patents. Age 39, family, Ph.D. (1952). Desires greater responsibility and opportunity to fill important need.

Enjoys planning novel and critical research and development. Box 3-45.

RESEARCH OR ACADEMIC POSITION: Degrees in metallurgical engineering and physical chemistry. Ph.D. (1948). Six years university teaching, 11 years fundamental and applied research, 2 years steel industry experience at management level. Thorough knowledge solid state, physical and mechanical metallurgy. Broad research experience in material mechanics, rheology, kinetics and phase transformations. Publications and patents in field of materials and processes. Seeking position in research or teaching where the development of sponsored fundamental research is encouraged. Resume on request. Box 3-50.

MATERIALS OR METALLURGICAL SCIENTIST: Single, B.S. in chemistry, M.S. in ceramics and recent Sc.D. in physical metallurgy. Desires position as research metallurgist or both research and teaching. Research experience in high-temperature refractory metals and ceramics. Interested in physical ceramics and metallurgical problems. Location not critical, but would prefer southern California or foreign countries, including India. Resume on request. Box 3-55.

CERAMIC ENGINEER: B.S. degree, married. Experience: porcelain enamel and ceramic protective coatings for corrosion and high-temperature resistance, electrical and nuclear properties; application of ceramics and cermets to high-temperature problems. Desires position of responsibility within 100 miles radius of New York City. Box 3-60.

METALLURGICAL ENGINEER: Sc.D. degree, age 38. Thirteen years diversified experience in development work and teaching. Major field imperfection theory and metal physics. Background includes high-temperature materials, nuclear metallurgy, heat treating and material selection. Interested in basic research or teaching. Box 3-65.

METALLURGICAL ENGINEER: Ph.D. in metallurgical engineering, age 40, married, one child. Ten years experience in research and development of high-temperature alloys, refractory metals, brazing alloys, cermets, including supervisory and consulting experience. Desires position of responsibility in materials engineering and development, West or Midwest. Box 3-70.

METALLURGICAL ENGINEER: M.S. degree, age 37. Nine years experience in alloy development and materials application in flight propulsion, automobile and electrical industries. Extensive knowledge of high-temperature, refractory, ferrous and nonferrous alloys. Seeks responsible position with opportunities for advancement. Box 3-75.

METALLURGICAL ENGINEER: Resourceful, mature, nation-wide, executive, engineering military contacts; process, explosives, missile industries: heat, corrosion resisting materials; fuel cells, electronic components. Capable program planning, coordinating, administering, profit-centered, advertising, sales promotion, forecasting, marketing research, development, now products. Location secondary. Salary commensurate. Employed. Box 3-80.

DOES YOUR FIELD PRODUCE MORE THAN YOU CAN READ?

If your field is metals, of course it does . . . and it's generating more and more information at greater volume all the time.

No longer is it possible to keep up as an individual . . . and fantastically costly and ineffectual on a company basis.

The solution is ASM's new electronic Information Searching system for storing and recalling specific published information. It is already answering the technical literature needs of many nationally known companies with unprecedented speed and economy. Actual results show that it provides ten times the amount of important, pertinent information than can be obtained by conventional searching methods.

Every metals article from more than 900 of the world's leading technical magazines is being abstracted and coded on electronic tape . . . Government reports, patents, books are included. Every week nearly 700 abstracts are added to this magnetic tape "library"—more than 35,000 a year.

As a subscriber to Information Service, you tell ASM the subject in which you are interested. Then, every two weeks ASM sends you abstracts of *all* the information that has *just been published* on this particular subject.

Any questions you may have will be answered promptly. Just fill out the coupon and return it. No obligation, of course.

HOW CAN INFORMATION SEARCHING KEEP ME UP TO DATE ON THE FOLLOWING SUBJECT OR SUBJECTS:

_____

_____

_____

Please Use Additional Paper If Necessary

Name:_____

Title:_____

Company:_____

Street:_____

City:_____ Zone:____ State:_____

AMERICAN SOCIETY FOR METALS — METALS PARK — NOVELTY, OHIO

SENIOR RESEARCH SCIENTISTS

Outstanding opportunities for scientists with Physical Metallurgy or Ceramics background interested in basic materials research. Responsible positions available for Ph.D's preferably with post-doctorate research experience.

Current group interests are in mechanical properties of crystalline and non-crystalline solids, including single and polycrystalline ceramics, refractory metals and plastics; oxidation mechanisms in metals; alloys for high temperature thermocouple purposes.

Write in confidence to: Dr. C. H. Li, Honeywell Research Center, Hopkins, Minnesota.

Honeywell

First in Control

To explore professional opportunities in other Honeywell locations, coast to coast, send your application in confidence to Mr. H. D. Eckstrom, Honeywell, Minneapolis 8, Minn.

METALLURGISTS AND POWDER METALLURGISTS

Three challenging positions in the powder metallurgy field with one of the large iron powder producers.

Service Engineering—

5-10 years experience in applied powder metallurgy and parts manufacturing. Applicant must be willing to travel about 30% of the time.

Development, Production—

Position of major responsibility, pilot plant development, thorough theoretical and practical knowledge of metallurgy necessary.

Research and Development—

Laboratory position for recent graduate metallurgist.

Interested metallurgists should send their resume, marked to the attention of the president. All information will be treated strictly confidential.

HOEGANAES SPONGE IRON CORP.

Riverton, New Jersey

the 3 minute glass

ALLAN RAY PUTNAM, Managing Director

The inspiration that an instructor may have for a student is nowhere better illustrated in the field of metallurgy than that which Prof. Frank Fanning Jewett had for Charles Martin Hall.

It was Prof. Jewett, lecturing at Oberlin College in Ohio, who pointed out that "if anyone should invent a process by which aluminum could be made on a commercial scale, not only would he be a benefactor to the world, but would also be able to lay up a great fortune for himself".

It was then that Hall, it is said, turned to a classmate in the next chair and promised, "I am going for that metal!" Eight months after graduation from Oberlin College, he made his promise good, revealing his discovery by bursting into his former professor's office with the barely cool globules of aluminum. "I've got it! Professor, I've got it!"

Charles Martin Hall discovered his aluminum process in Oberlin on Feb. 23, 1886. He was 22 years old.

Speaking at an observation of the 75th anniversary of this discovery, sponsored at Oberlin College by the Aluminum Association on Feb. 23 of this year, ASM President William A. Pennington, himself a college professor, spoke of the importance of this discovery in these words: "There is small need for me to expatiate on the mental and personal qualities of Charles Martin Hall which led to the *greatest* discovery in the metallurgical field ever made by an American, and I say 'greatest' advisedly. Let me remind you that when Hall's youthful contemporaries said 'metal', they could think of no more than ten chemical elements and their alloys—some known since before history began. Of course, chemists had isolated most of the 74 metallic elements in the periodic sequence, but only a handful were used in any quantity, either pure or in combination. The discovery of an economical commercial process for winning the abundant metal aluminum from its refractory ores was therefore an unprecedented feat, and one might truly say that it has been accomplished only twice since then—for nickel and for magnesium".

Examples of professorial inspiration for a student, as that which Jewett had for Hall, are not usually so dramatic, local in setting, nor fast-acting. On the contrary, accomplishments of former students do not reach the ears of professors and instructors with regularity, if at all. Most certainly, the acknowledgment of inspiration is rare, although it must exist more commonly than is supposed.

Although the real income to Hall was great as the result of his satisfying discovery, the psychic income to his former professor was indeed high. "My great discovery", Jewett observed 50 years later, "was the discovery of a man".

Actually, of course, Jewett had done more than this. Jewett had isolated a problem, had accurately foretold the consequences of its solution, and had communicated it to a young man who had a lifetime ahead of him. Jewett may have thought he was addressing a class at the time, but as far as Charles Martin Hall was concerned, he was talking directly to him.

This bold adventure of inspiring others fortunately is not limited to the ranks of college professors. It can be a universal experience, and can particularly be nourished in the climate of an engineering, technical and scientific society.

The 115 monthly meeting halls of ASM chapters, the wide-spread person-to-person contact among ASM members, the educational courses and activities—all of these provide unequalled opportunity for isolating and communicating problems of magnitude in the field of metals. The psychic income for an ASM member who has inspired another can be akin to that of Jewett's.

Among ASM's membership and student membership are the future Charles Martin Halls and their brothers. It is up to the rest of us to find them and challenge them.

The 16th METALLOGRAPHIC EXHIBIT

Detroit, October 23 to 27, 1961

All metallographers—
everywhere—
are cordially invited to
display their best work.

RULES FOR ENTRANTS

Exhibitors do not need to be members of the American Society for Metals.

Work which has appeared in previous metallographic exhibits held by the American Society for Metals is unacceptable.

Photographic prints should be mounted on stiff cardboard, extending no more than 3 in. beyond edge of print in any direction; maximum dimensions 14 by 18 in. (35 by 45 cm.). Heavy, solid frames are unacceptable.

Entries should carry a label on the *face of the mount* giving:

Classification of entry.

Material, etchant, magnification and other desirable data.

A brief statement (if desired) calling attention to any unusual aspect of the entry.

The name, company affiliation and postal address of the exhibitor should be placed on the *back of the mount* together with a request for return of the exhibit if so desired.

Entrants living outside the United States should send their micros by first-class letter mail endorsed "Photo for Exhibition — No Commercial Value — May Be Opened for Customs Inspection".

Exhibits must be delivered before Oct. 10, 1961, either by prepaid express, registered parcel post or first-class letter mail, addressed:

Metallographic Exhibit
American Society for Metals
Metals Park
Novelty, Ohio, U. S. A.

CLASSIFICATION OF MICROS

Class 1. Irons and steels, cast and wrought
Class 2. Stainless steels and heat resisting alloys
Class 3. Aluminum, magnesium, beryllium, titanium and their alloys
Class 4. Copper, nickel, zinc, lead and their alloys
Class 5. Uranium, plutonium, thorium, zirconium and reactor fuel and control elements
Class 6. Metals and alloys not otherwise classified
Class 7. Series showing transitions or changes during processing
Class 8. Welds and other joining methods
Class 9. Surface coatings and surface phenomena
Class 10. Slags, inclusions, refractories, cermets and aggregates
Class 11. Electron micrographs using replicas
Class 12. Electron micrographs (transmission)
Class 13. Color prints in any of the above classes
Class 14. Results by unconventional technique

AWARDS AND OTHER INFORMATION

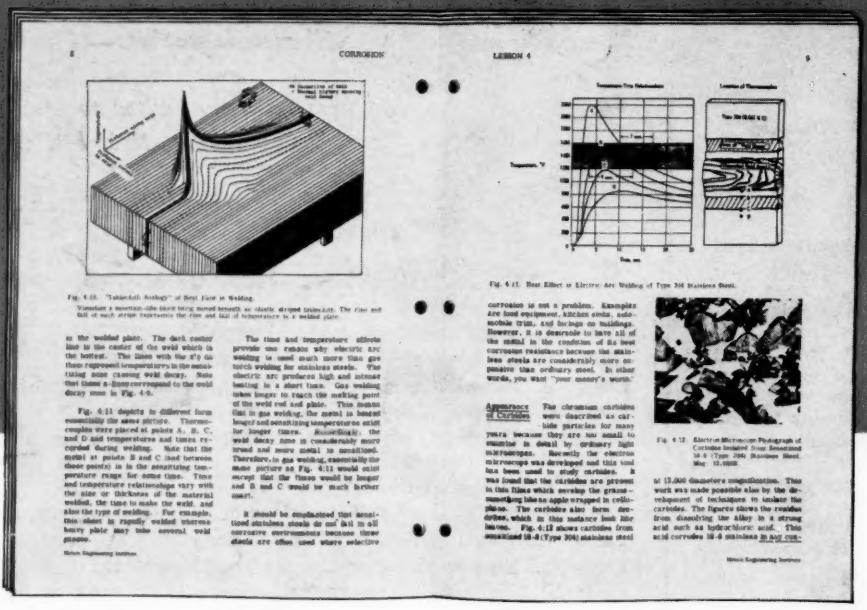
A committee of judges will be appointed by the Metal Congress management which will award a First Prize (a medal and blue ribbon) to the best in each classification. Honorable Mentions will also be awarded (with appropriate medals) to other photographs which in the opinion of the judges closely approach the winner in excellence. A Grand Prize, in the form of an engrossed certificate and a money award of $500 from the Adolph I. Buehler Endowment will also be awarded the exhibitor whose work is judged best in the show, and his exhibit shall become the property of the American Society for Metals for preservation and display in the Society's national headquarters.

All prize-winning photographs will be retained by the Society for one year and placed in a traveling exhibit to the various Chapters.

43rd NATIONAL METAL CONGRESS & EXPOSITION

Cobo Hall, Detroit——————————Oct. 23 to 27, 1961

Become technically informed on... CORROSION



with this NEW MEI COURSE

This 15-lesson course treats both the fundamental and practical aspects of corrosion in numerous environments. Chemical, mechanical, electrical, and metallurgical factors are discussed. You'll learn about temperature and stress effects, testing procedures, as well as the pros and cons of numerous alloys in severely corrosive media.

In practically every industry, corrosion is a costly and troublesome problem. Now in a new, up-to-the-minute MEI home study course, also suitable for in-plant training, a recognized authority, Dr. Mars G. Fontana, has provided fifteen information-packed, clearly-written lessons on corrosion. The experienced MEI staff stands ready to lend their assistance and guidance to help you earn your certificate of completion on this subject, one so vital that American industry pays big premiums to its technical masters.

Dr. Fontana graduated from the University of Michigan with a B.S. in Chemical Engineering, and a Ph.D. in Metallurgical Engineering. From 1934 to 1945 he served as metallurgical engineer and supervisor in the Engineering Department, E. I. du Pont de Nemours and Co., Inc., Wilmington, Delaware. He is presently Professor and Chairman, Department of Metallurgical Engineering; Director, Corrosion Research Laboratories, Engineering Experiment Station, Ohio State University.

Metals Engineering Institute

a division of the

AMERICAN SOCIETY FOR METALS

Metals Park, Novelty, Ohio

LESSON TITLES

1. Nature and Extent of Corrosion
2. Electromotive Force and Galvanic Series
3. Galvanic, Concentration Cell, and Uniform Corrosion
4. Pitting and Intergranular Corrosion
5. Stress Corrosion
6. Erosion—Corrosion
7. Parting, Cavitation, and Fretting Corrosion
8. Corrosion Testing
9. Corrosion Tests
10. Corrosion by Sulfuric Acid
11. Hydrochloric and Nitric Acids
12. Corrosion by Various Other Environments
13. Alloying for Better Corrosion Resistance
14. Combating Corrosion
15. High Temperature Corrosion

Dr. Anton de S. Brasunas
Director **MR-31**
Metals Engineering Institute
American Society for Metals
Metals Park, Novelty, Ohio

Please send me complete information about MEI's new Corrosion Course, at no obligation.

Name_____

Address_____

_____

_____

Firm_____

Title_____